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The *NFIRE* Launch: Beating the Sophomore Slump at the Wallops Range

NFIRE (Near-Field Infrared Experiment) launched successfully on schedule at 2:48 a.m., April 24, 2007, from the Wallops Range. The mission for the Missile Defense Agency (MDA) would later include ballistic missile underflights launched in 2008 from Vandenberg Air Force Base in California.

NFIRE marked the sixth successful satellite launch of a *Minotaur I*. Under the feedback reporting system developed by the Air Force and MDA for all aspects of the *Minotaur* missions, the "range support" provided by Wallops, which encompassed the entirety of the range's efforts, received a grade of "A."

At the Range Readiness Review, Jay Pittman, Wallops range chief, was confronted with the same questions posed in the discussion section of the case study, and was asked to make a "ready" or "not ready" call. The four main issues Pittman encountered, and their significance, are discussed briefly below.

The Nozzles: Not My Problem

Once it was established that the nozzles could not affect the flight termination system (FTS) performance and, therefore, the ability of the range to perform its primary duty of safety, the nozzles became a non-issue from a range perspective. The customer's acceptance of the risk that any nozzle anomaly would affect its mission was sufficient to close the issue. In Pittman's words, "Remember, the roles established last time worked well, so do not abandon them. Even though it is not 'natural' for anyone at NASA to see such a seemingly fundamental issue and analyze it into oblivion, that path would have led to NASA inserting itself into a mission assurance role where it had none."

NFIRE launches aboard a Minotaur I from NASA's Wallops Range on April 24, 2007. NASA image

There was much discussion of this at the review by panel members and management not familiar with range processes, but in the end there was unanimous agreement that this was a customer, not a range, risk. Data collected during flight indicated that the expert panel had been correct in stating that the pressurized nozzles would not experience the oscillation. In addition, the "violence" of the oscillation shown in the documentary film was revealed to be an "artifact" of the oscillation frequency and the "film speed." The actual deflections were a relatively low rate and not at all violent or threatening to the vehicle's performance.

The DQCA: Your Biggest Problem

Data Quality Computer "A" presented multiple issues. If the problem had been present throughout the redundant systems, the entire system would have been suspect. A total system failure would have forced a flight termination of a good launch vehicle. Such a breakdown would have represented a fundamental failure to deliver primary range services. It was quickly established that the main risk was that one side would fail just prior to liftoff. Such a failure could have required an enormously expensive delay and probably would have doubled the cost of overall launch support services to the customer.

The project manager's suggestion was a good one, and it was taken. It was possible to accomplish the re-installation, testing, and certification of the legacy system only because of the presence of the range integration test manager. His early availability allowed the integration and test process to accommodate the additional testing required at that late stage. He was able to provide a complete and credible integration and test plan to establish the functionality of the new system. Both the DQCA and the legacy system functioned nominally for the remainder of the launch. The legacy system has been removed completely, and DQCA has functioned properly for multiple launches since that time.

The Navy P-3: An Unsolvable—But Manageable—Worry

Some things depend on procedures being followed on launch day. The *P-3* situation was one of them. While the right procedures had been followed for requesting radio-frequency (RF) silence in previous practice sessions, apparently the knowledge that the sessions weren't launch day led to lax adherence to procedure. After much discussion among board members and contact with other launch ranges, it became clear that careful frequency monitoring, air traffic surveillance, and real-time contact with the coordinating Navy offices was essential. On launch day, *P-3* traffic in the Atlantic region was monitored tightly, as was air traffic in and around Wallops, and RF emissions. There were no issues associated with RF emissions. Had there been any, the launch would have been held or postponed, but no advance action was considered worth taking.

The Communications Channels: Learn Your Lessons

The clear communications lesson from the *TacSat-2* mission was that just because Wallops had always done something one way did not mean that the operational staff could not follow procedure and use assigned channels. The noise, however, was a known problem that could not be fixed without an investment that was not viable at the time. Therefore, the clear path was to optimize channel assignments based on the noise studies and require operational staff to adhere to those assignments. Numerous "anomaly practice sessions" were used to try to cause communications errors involving the intercoms, but both the rehearsals and the operation went smoothly with little or no errors.

Lessons for Success

In all, more than 200 individual lessons were documented from *TacSat-2*, the first *Minotaur* launch at Wallops. Each was recorded in a form that:

- *Required action*. This ensured that the lesson would not, as Pittman said, "sit out there waiting to be forgotten until someone else had the misfortune of relearning it."
- *Surfaced, in context, at a review*. This ensured that both the project manager and the review panels were faced with the clear statement of a best practice or problem from a previous mission. "Such presentations," Pittman said, "virtually demand the question, 'So what are you doing this time?' Many times the success or failure of a mission stands on that question being asked."